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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/815,659	03/23/2001	Ralf Arnold	GR 98 P 8109 P	6020

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EXAMINER	
CONNOLLY, MARK A	

ART UNIT	PAPER NUMBER
2115	7

DATE MAILED: 05/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/815,659	ARNOLD ET AL.	
	Examiner	Art Unit	
	Mark Connolly	2115	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 March 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 19-26* is/are rejected.

7)☒ Claim(s) *18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 March 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5&6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-26 have been presented for examination.

Drawings

2. The drawings are objected to because the Precode Unit (1) in fig. 11 is constantly referred to as a predecode unit (1) in the specification [page 2 line 8, page 3 line 4]. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 and 6-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants Admitted Prior Art [AAPA] in view of Mason et al [Mason] US Pat No 5946219.

5. Referring to claim 1, the AAPA teaches the invention substantially including:

a. a configurable hardware block comprising a subunit which is required for executing a respective command [page 4 lines 3-18 and fig. 11]. The s-unit (4) is interpreted as a configurable hardware block and the functional unit (42) is interpreted as a given type of subunit.

b. implementing one of commands and command sequences of a program to be executed [page 2 lines 15-21].

c. ascertaining configuration data with the step of implementing the one of commands and command sequences [page 2 lines 15-21].

d. configuring the configurable hardware block by using the configuration data [page 2 lines 15-21].

The AAPA does not explicitly teach:

e. ascertaining a given type of subunit of a configurable hardware block, the given type of subunit being required for executing a respective command

f. selecting, if available, a subunit of the given type of subunit

g. configuring connections provided around the subunit selected in the selecting step if the subunit of the given type of subunit is found in the selecting step

In summary, AAPA does not explicitly teach configuring a selected portion of a subunit (if available) located within the configurable hardware block. Mason explicitly teaches a configuring a selected portion of a subunit [col. 1 line 45 – col. 2 line 41]. Furthermore, it is obvious that the portion to be configured would only be selected if it were available in order to prevent the subunit from malfunctioning. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the device taught by Mason into the AAPA system because as Mason explicitly states, it would allow the device to be reconfigured "without having to program the entire device" which obviously saves an time [col. 1 line 67-col. 2 line 1].

6. Referring to claims 6 and 7, it is obvious that the implementing step would automatically end if a hardware component required for the implementing step were not available because the system could not run if it does not have adequate resources.

7. Referring to claim 8, the AAPA-Mason system teaches assigning virtual units to functionally configurable physical subunits of the configurable hardware block, the virtual units representing functions which can be imparted to the functionally configurable physical subunits by respectfully configuring the functionally configurable physical subunits [see col.1 lines 45-51 in Mason].

8. Referring to claims 9-11, Mason teaches using a record and list for configuring the hardware block [abstract and fig. 4].

9. Referring to claim 12, it is obvious that the system would search for a particular virtual unit if it were required to configure the hardware block in order to execute a command otherwise the system would be unable to configure itself.

10. Referring to claim 13, Mason teaches that each physical subunit is used for one operation only [fig. 10A]. Therefore it is obvious that the other virtual units within the physical subunit would remain unused.

11. Claims 2-5, 14-17 and 19-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA and Mason as applied to claims 1 and 6-13 above, and further in view of Greenbaum et al [Greenbaum] US Pat No 6077315.

12. Referring to claims 2 and 3, although the AAPA-Mason system explicitly teaches implementing commands by configuring a configurable hardware block, the system does not explicitly teach that the implementing step begins and ends with a first and last command in a command block in which the command block has one entry and one exit point. Greenbaum explicitly teaches that when a loop is to be processed, it should be processes using reconfigurable

logic [col. 2 lines 33-37]. Loop unrolling is well known concept in complier design and when a loop is unrolled it has only one entry and one exit point. It would have been obvious to include the teachings of Greenbaum into the AAPA-Mason system because Greenbaum teaches that using reconfigurable logic to execute loops increases execution speed [col. 2 lines 33-37]. It is interpreted by the examiner that the functional unit (42) in the AAPA could be used as the reconfigurable FPGA in Greenbaum.

13. Referring to claims 4 and 5, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the implementing step on a hyperblock basis. What happens during loop unrolling is that the complier needs to convert the loop into assembly code so that it can be executed. During this unrolling process, the loop is broken up into distinct portions (or blocks) wherein the instructions in each block are executed immediately and sequentially in order. These blocks are broken up by things like branch and jump instructions. Because the instructions within each block are always executed together, it would be obvious to configure individual portions of the functional unit (42) to implement individual blocks of instructions. Implementing based on instruction blocks is interpreted as implementing on a hyperblock basis.

14. Referring to claims 14 and 15, it is obvious that the AAPA-Mason-Greenbaum system checks a source to determine if the memory previously had information written to it when configuring the connections around the subunit. This is because a loop needs to repetitively perform operations on data and therefore the system needs to determine if it is to operate on data from a data source (initial data passed into the loop) or further perform operations on modified data (interpreted as a data signal). It would be obvious to perform the checking when

configuring the connections because the subunits need to either load the data source or signal source which would affect the routing of the configurable connections to either connect the data source or signal source to the subunit. Furthermore, it is obvious that the last subunit used to execute the loop would act as a source because it would have to feed the data, which was just operated on, back to the beginning of the loop thereby acting as a source.

15. Referring to claim 16, it is obvious that the AAPA-Mason-Greenbaum system checks a destination to determine if the memory previously had information written to it when configuring the connections around the subunit. This is because a loop needs to repetitively perform operations on data and therefore the system needs to determine if it is to operate on data from a data destination (final data passed out of the loop) or further perform operations on modified data (interpreted as a signal destination). It would be obvious to perform the checking when configuring the connections because the subunits need to either pass the data from the loop or pass the data back to the beginning of the loop and would therefore affect the routing of the configurable connections to either connect the output data to an external subunit or back to the first subunit executing the loop. Furthermore, it is obvious that the last subunit used to execute the loop would act as a source because it would have to feed the data, which was just operated on, back to the beginning of the loop thereby acting as a source.

16. Referring to claim 17, it is obvious that another memory area would be used as a destination if it has data stored from another subunit so that in case the other subunit needed to recall the data, it would not be overwritten.

17. Referring to claims 19 and 20, it is obvious that the AAPA-Mason-Greenbaum system selected a constant from either a data or signal source because the purpose of a loop is to perform

specific operations on data until a specific condition is met. When the loop is initially entered, a variable is passed into the loop. This is interpreted as a constant being loaded from a data source. After the first iteration of the loop, if the specific condition has not been met, then the data, which has just been operated on and now modified, is passed back to the beginning of the loop so that the specific operations can be performed on the modified data again. The passing of the modified data back to the beginning of the loop is interpreted as a constant being loaded from a data signal. Additionally, the data must be stored in a memory in order to be recalled and operated on in future iterations of the loop. It is obvious that this modified data could be stored in a new memory area.

18. Referring to claim 21, Mason teaches that not only can basic logic be realized but "higher level logic functions" can be realized as well [col. 1 lines 48-51]. Because during loop unrolling the instructions are broken into blocks, it would have been obvious to create pseudo-hyperblocks that include a plurality of hyperblocks.

19. Referring to claim 22, if-conversions are well known techniques used in loop unrolling. The breaking up of the instructions into distinct blocks is the end result of an if-conversion. Because the pseudo-hyperblocks are created from a plurality of hyperblocks and because the if-conversion unrolls the loop into blocks comprising the instructions, each instruction corresponding to a hyperblock, it is obvious that the if-conversion ultimately forms the pseudo-hyperblock.

20. Referring to claim 23, the AAPA teaches that the commands are used as configuration data [page 2 lines 15-21] and therefore it is obvious that the AAPA-Mason-Greenbaum system implements commands as configuration data on the pseudo-hyperblocks.

21. Referring to claims 24-26, these are rejected on the same basis as set forth hereinabove.

Allowable Subject Matter

22. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Connolly whose telephone number is (703) 305-7849. The examiner can normally be reached on M-F 8AM-5PM (except every first Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas C Lee can be reached on (703) 305-9717. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Connolly
Examiner
Art Unit 2115

THOMAS LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

mc
May 3, 2004
mc